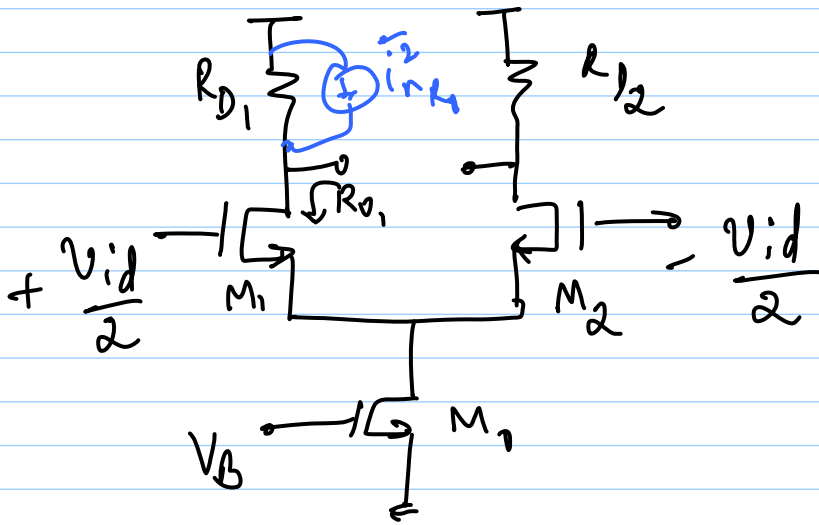


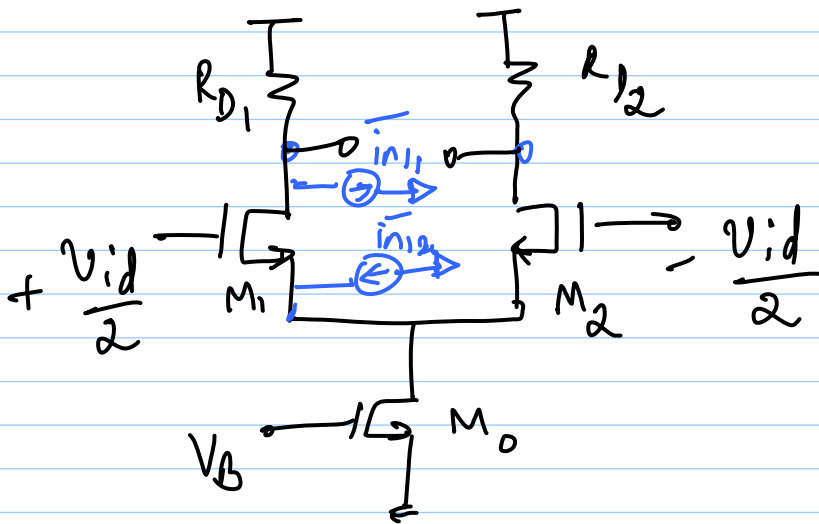
1-2-13

Lec 12



$$R_{D1} \approx 2r_{ds1}$$

$$\overline{v_{on}^2}_{R_{D1,2}} = 4kT R_{D1,2} \Delta f$$



$$\overline{v_{on}^2}_{M1,2} = \frac{8kT}{3} g_{m1,2} R_D^2 \left\{ \begin{array}{l} \text{all from} \\ \hat{i}_{n1} \end{array} \right\}$$

Assume Δv_{in} exists @ input

Δv_{in}

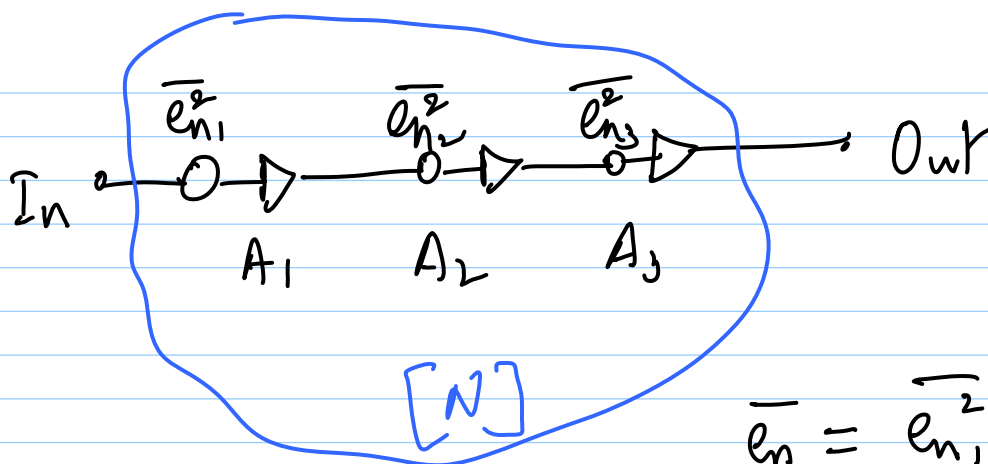
$$\Delta I_{D1} - \Delta I_{D2} = g_m \Delta v$$

$$= \sqrt{2\mu_n C_{ox} \frac{W}{L} \left(\frac{I_0 + \bar{i}_n}{2} \right)} \cdot \Delta v_{in}$$

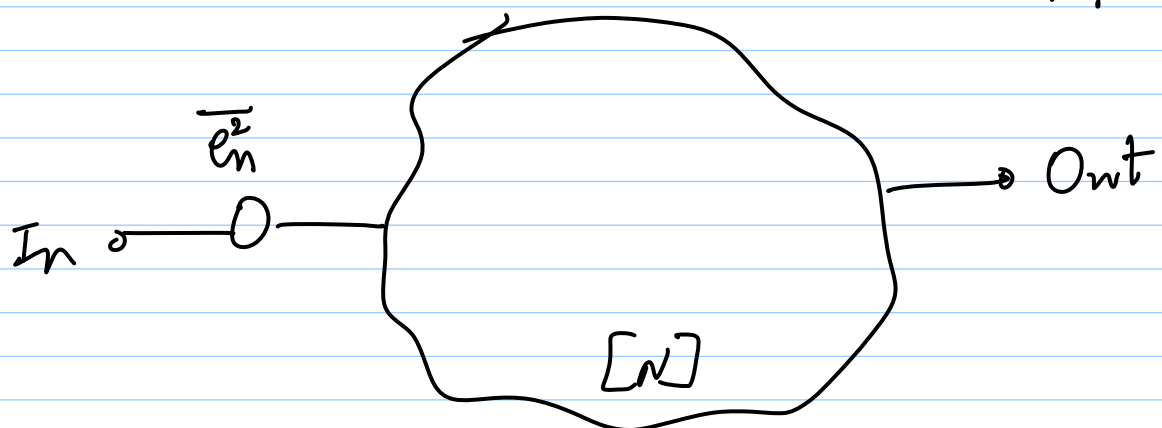
$\bar{i}_n = \text{noise from } M_0$

$$\approx \sqrt{2\mu_n C_{ox} \frac{W}{L} \left(\frac{I_0}{2} \right)} \left[1 + \frac{\bar{i}_n}{2I_0} \right]$$

$$\approx g_m \Delta v_{in} \left[1 + \bar{i}_n / 2I_0 \right]$$



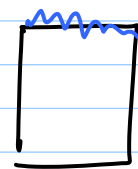
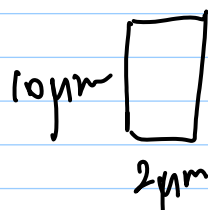
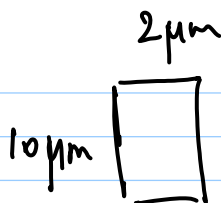
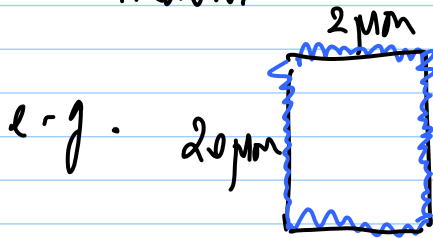
$$\bar{e}_n = \bar{e}_{n1}^2 + \frac{\bar{e}_{n2}^2}{A_1^2} + \frac{\bar{e}_{n3}^2}{(A_1 A_2)^2}$$



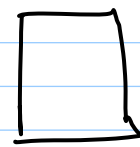
Mismatch

- * keep transistors close to each other
- * Even if V_{as} & V_{ds} are the same, mismatch in V & I from μ_n , W_x , $(\frac{W}{L})$, V_T

- * Random mismatch
- * Systematic mismatch



C_1



C_2